CLAIMS

Having thus described the aforementioned invention, we claim:

1. A detector assembly for quantifying concentration of positron emitters in fluids within a microfluidic assembly, comprising:

a base;

a window formed in the base;

a microfluidic channel disposed in the base for allowing liquids to flow through the base;

a solid-state charged particle detector supported by the base wherein the window is interpositioned between the charged particle detector and the microfluidic channel; and

the window has a thickness sufficient to allow transmission of beta particles from positron emitters within the microfluidic channel to be detected by the solid-state charge particle detector.

2. The detector assembly of Claim 1 wherein:

a portion of the base adjacent the window and supporting the solid state charge particle detector has a thickness sufficient to substantially attenuate the transmission of beta particles whereby a linear resolution of the solid-state charge particle detector is increased.

3. The detector assembly of Claim 1 further comprising:

a collimation well of a selected depth is disposed in the base.

4. The detector assembly of Claim 3, wherein:

the collimation well is disposed between the window and the solid-state charge particle detector.

5. The detector assembly of Claim 4, wherein the collimation well further comprises:

a continuous side wall defined by the base.

6. The detector assembly of Claim 5, wherein the collimation well further includes:

a depth sufficient to collimate the beta particles emitted from the liquid within the microchannel enabling the detector to delineate between the particles passing through the window and those attenuated by the base.

7. The detector assembly of Claim 1 wherein:

the base and the solid-state charged particle detector are integral with one another.

8. The detector assembly of Claim 1 wherein:

a first electrode of the solid-state charge particle detector is disposed on a first side of the base and a second electrode of the solid-state charge particle detector is disposed on a second side of the base in spaced relation from the first side of the base.

9. The detector assembly of Claim 8 wherein:

the microfluidic channel is disposed adjacent the first or the second and the second electrodes.

10. The detector assembly of Claim 1 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

11. The detector assembly of Claim 6 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

12. The detector assembly of Claim 7 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, acrylic, silicon, or derivatives thereof.

13. The detector assembly of Claim 9 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, acrylic, silicon, or derivatives thereof.

14. A detector assembly for quantifying a concentration of positron emitters in a microfluidic assembly, the beta detector assembly comprising:

a base;

a microfluidic channel disposed in the base enabling fluids to flow through the base;

collimation means disposed in the base proximate the microfluidic channel for collimating charged particles; and

a solid-state charged particle detector supported by the base and in communication with the collimation means.

15. The detector assembly of Claim 14 wherein:

a portion of the base adjacent the window and supporting the solid state charge particle detector has a thickness sufficient to substantially attenuate the transmission of beta particles whereby a linear resolution of the solid-state charge particle detector is increased.

16. The detector assembly of Claim 14, wherein:

the collimation means is disposed between the window and the solid-state charge particle detector.

17. The detector assembly of Claim 16, wherein the collimation means further comprises:

a continuous side wall defined by the base.

18. The detector assembly of Claim 17, wherein:

the collimation means has a depth sufficient to collimate the charged particles emitted from the liquid within the microchannel enabling the detector to delineate between the particles passing through the window and those attenuated by the base.

19. The detector assembly of Claim 14 wherein:

the base and the solid-state charged particle detector are integral with one another.

20. The detector assembly of Claim 14 wherein:

a first electrode of the solid-state charge particle detector is disposed on a first side of the base and a second electrode of the solid-state charge particle detector is disposed on a second side of the base in spaced relation from the first side of the base.

21. The detector assembly of Claim 20 wherein:

the microfluidic channel is disposed adjacent the first or the second and the second electrodes.

22. The detector assembly of Claim 14 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

23. The detector assembly of Claim 18 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

24. The detector assembly of Claim 19 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

25. A detector assembly for quantifying a concentration of positron emitters in a microfluidic assembly, the beta detector assembly comprising:

a base;

a microfluidic channel disposed in the base enabling fluids to flow through the base;

a solid-state charged particle detector supported by the base; and

window means disposed in the base adjacent the microfluidic channel for increasing the linear resolution of the solid-state charge particle detector.

26. The detector assembly of Claim 25 wherein:

a portion of the base adjacent the window means and supporting the solid state charge particle detector has a thickness sufficient to substantially attenuate the transmission of beta particles whereby a linear resolution of the solid-state charge particle detector is increased.

27. The detector assembly of Claim 25 further comprising:

a collimation well of a selected depth is disposed in the base.

28. The detector assembly of Claim 27, wherein:

the collimation well is disposed between the window means and the solid-state charge particle detector.

29. The detector assembly of Claim 27, wherein:

the collimation well further comprises: a continuous side wall defined by the base.

30. The detector assembly of Claim 29, wherein the collimation well further includes:

a depth sufficient to collimate the beta particles emitted from the liquid within the microchannel enabling the detector to delineate between the particles passing through the window and those attenuated by the base.

31. The detector assembly of Claim 25 wherein:

the base and the solid-state charged particle detector are integral with one another.

32. The detector assembly of Claim 25 wherein:

a first electrode of the solid-state charge particle detector is disposed on a first side of the base and a second electrode of the solid-state charge particle detector is disposed on a second side of the base in spaced relation from the first side of the base.

33. The detector assembly of Claim 32 wherein:

the microfluidic channel is disposed adjacent the first or the second and the second electrodes.

34. The detector assembly of Claim 25 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

35. The detector assembly of Claim 28 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

36. The detector assembly of Claim 31 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.

37. The detector assembly of Claim 32 wherein:

the base is at least in part made from a material selected from the group of materials consisting of glass, polymer, silicon, or derivatives thereof.